

Asian Women in Transplantation - Gender Issues in Transplantation-Biologic Perspectives

Sex hormones and their influenced on the kidney

Yunmi KIM

The prevalence of chronic kidney disease (CKD) is high in women, but the proportion of patients undergoing dialysis and transplantation is high in men around the world. It is known that the rate of progression of kidney disease is slower in women than in men. These sex-related differences in kidney disease can be largely attributed to biological aspects, especially differences in sex hormones, although social and cultural factors can also influence on it.

Reviewing the results of previous in vitro and in vivo animal experiments, sex hormones directly affect cellular metabolism by influencing the expression of specific genes or the signaling pathway. Estrogen reduces glomerular extracellular matrix deposition and attenuates fibrosis associated with renal injury by inhibiting the synthesis of mesangial matrix components such as type 1 collagen and type 4 collagen and increasing the rate of matrix degradation. Estrogen reduces the expression of transforming growth factor- β in the kidney and shows a protective effect against apoptosis of mesangial cells and podocytes, whereas testosterone has the opposite effect. Estrogen also affects the renin-angiotensin system activity. It increases the expression of angiotensin type 2 receptor in the kidney, thereby increasing nitric oxide production and the expression of prostaglandin E₂, and decreases the expression of angiotensin type 1 receptor, thereby attenuating sodium retention and renal vasoconstriction. Estrogen also increases endothelial nitric oxide synthase, inhibits the synthesis of endothelin, and decreases the production of superoxide.

As such, endogenous estrogen seems to exhibit a protective effect on the kidneys, and hypoestrogenism in CKD patients appears to undermine immune response and increase mortality due to infections or malignancy. However, the effect of exogenous estrogens such as oral contraceptives or postmenopausal hormone therapy on kidneys is still controversial in human studies. More research is needed on the effects of hormone therapy on clinical outcomes in patients with CKD.